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CONTENTS

APPLICATION OF THE NATIONAL ELECTRICAL SAFETY CODE

The National Electrical Safety Code, issued by the bureau, is generally recognized as a standard for electrical construction which establishes good practice from the standpoint of accident prevention. It has been widely used by contractors and by utility companies operating in the fields of electric light, power, railways, telephone, and telegraph, and by electrified railroads. It is frequently referred to by State and municipal officials, and is a standard of reference for matters in dispute.

The Federal Government does not administer the code and does not have any legal powers of supervision over electrical construction in general. The services of the bureau have been confined to the technical work of preparing an acceptable code which represents good current practice, in establishing it as a recognized standard, in assisting in its interpretation where necessary, and in its periodical revision. Enforcement of the code requirements rests with local officials who may have legal jurisdiction. The code is recognized as an American standard by the American Standards Association (formerly the American Engineering Standards Committee). It has been legally adopted by a few cities, and parts of it have been incorporated in municipal rules. Its principal application, however, has been by State public service commissions and industrial commissions or departments of labor. It has been adopted in whole or in part by about half of the States, and has been applied also in some of the Canadian Provinces. It is expected that revised rules will be promulgated in 1929 by the California Railroad Commission and also in North Dakota and in Wisconsin. In Colorado and Pennsylvania the public-service commissions are expected to issue new orders dealing with line construction. In Maryland the code has been adopted by the Industrial Accident Commission, and during the current year it is expected that the Public Service Commission will take similar action which will govern utilities coming under its jurisdiction.

The State commissions adopting the code have in most cases limited jurisdiction, so that no one commission has power to apply all parts of the code. In a few of the States, however, the entire code has been adopted, namely, in Arizona, Maryland, and New Jersey.

In a few cases, the code has been established by action of the State legislature. In Montana such action applied to part 2, and in Oregon to part 3.

In California, in 1918, the Industrial Accident Commission adopted Electrical Station Safety Orders based upon part 1 of the National Electrical Safety Code, but in 1926 this order was rescinded; and since then the code itself has been used as a standard of reference. Part 1 has been adopted in Maine, Michigan, Oregon, Pennsylvania, and Wisconsin.

Part 2 of the code, dealing with overhead and underground construction, is the part which has received most attention from the public utility commissions of the various States, and hence it is the part that has had the widest legal application. It has been adopted verbatim or with slight modification in the States of Idaho, Iowa, Maine, North Dakota, Oklahoma, Oregon, and Utah. It has also been utilized as the basis of similar rules in California, Illinois, Kansas, Michigan, Nevada, and Wisconsin. Crossing specifications based upon the code have been adopted in Minnesota, Nebraska, North Carolina, South Dakota, and Tennessee.

The rules in part 2, referring to the joint use of poles by different utilities, were made the basis of a commission order in Connecticut.

Part 3 has been adopted by title in Maine, verbatim in Pennsylvania, and has formed the basis of rules adopted in California, Michigan, Washington, and Wisconsin.

Part 4 has been adopted by title in Maine and Oregon, verbatim in Pennsylvania, and has formed the basis for rules adopted in Michigan and Wisconsin.

Part 5, dealing with radio rules, has formed the basis for State rules in Nevada.

The definitions appearing in section 1 of the code have usually been adopted in connection with the use of the rules in the various parts of the code. The rules on gounding, which constitute section 9 of the code, have been adopted in Colorado, Maine, Oregon, and Pennsylvania, and have formed the basis for rules adopted in California, Michigan, and Wisconsin.

A number of State commissions which have taken no legal action to make the code rules mandatory have, nevertheless, used them as a standard of reference and have required utilities to construct their lines in conformity with part 2 of the code. This is especially true in Colorado, Connecticut, Indiana, Missouri, New York, Virginia, and West Virginia.

RADIO SIGNAL TRANSMISSIONS OF STANDARD FREQUENCY, MARCH TO JULY

The bureau announces a new schedule of radio signals of standard frequencies, for use by the public in calibrating frequency standards and transmitting and receiving apparatus. This schedule includes many of the border frequencies between services as set forth in the allocation of the International Radio Convention of Washington which went into effect January 1, 1929. The signals are transmitted from the bureau's station WWV, Washington, D. C. They can be heard and utilized by stations equipped for continuous-wave reception at distances up to 1,000 miles from the transmitting station.

The transmissions are by continuous-wave radiotelegraphy. The modulation which was previously on these signals has been eliminated. A complete frequency transmission includes a "general call" and "standard frequency" signal, and "announcements." The "general call" is given at the beginning of the 8-minute period and continues for about two minutes. This includes a statement of the frequency. The "standard frequency" signal is a series of very long dashes with the call letter (WWV) intervening. This signal continues for about four minutes. The "announcements" are on the same frequency as the "standard frequency signal" just transmitted and contain a statement of the frequency. An announcement of the next frequency to be transmitted is then given. There is then a 4-minute interval

while the transmitting set is adjusted for the next frequency.

Information on how to receive and utilize the signals is given in Letter Circular No. 171, which may be obtained by applying to the Bureau of Standards, Washington, D. C. Even through only a few frequency points are received, persons can obtain as complete a frequency meter calibration as desired by the method of generator harmonics, information on which is given in the letter circular. The schedule of standard frequency signals is as follows:

March 20, 10 to 10.08 p. m., E. S. T., 1,500; 10.12 to 10.20, 1,700; 10.24 to 10.32, 2,250; 10.36 to 10.44, 2,750; 10.48 to 10.56, 2,850; 11 to 11.08, 3,200; 11.12 to 11.20, 3,500; 11.24 to 11.32, 4,000 kilocycles.

April 22, 10 to 10.08 p. m., E. S. T., 4,000; 10.12 to 10.20, 4,500; 10.24 to 10.32, 5,000; 10.36 to 10.44, 5,500; 10.48 to 10.56, 6,000; 11 to 11.08, 6,500; 11.12 to 11.20, 7,000; 11.24 to 11.32, 7,300 kilocycles.

May 20, 10 to 10.08 p. m., E. S. T., 125; 10.12 to 10.20, 150; 10.24 to 10.32, 200; 10.36 to 10.44, 250; 10.48 to 10.56, 300; 11 to 11.08, 375; 11.12 to 11.20, 450; 11.24 to 11.32, 550 kilocycles.

June 20, 10 to 10.08 p. m., E. S. T., 550; 10.12 to 10.20, 600; 10.24 to 10.32, 700; 10.36 to 10.44, 800; 10.48 to 10.56, 1,000; 11 to 11.08, 1,200; 11.12 to 11.20, 1,400; 11.24 to 11.32, 1,500 kilocycles.

July 22, 10 to 10.08 p. m., E. S. T., 1,500; 10.12 to 10.20, 1,700; 10.24 to 10.32, 2,000; 10.36 to 10.44, 2,300; 10.48 to 10.56, 2,700; 11 to 11.08, 3,100; 11.12 to 11.20, 3,500; 11.24 to 11.32, 4,000 kilocycles.

CHROMIUM-PLATED LABORATORY WEIGHTS

The hardness of chromium plating is a considerable advantage in the case of weights that are much used but this advantage is somewhat offset by the susceptibility of such a coating to attack by fumes of hydrochloric acid. However, it seemed worth while for the bureau to try this plating on three sets of weights which have been put into use in the chemistry division. In preparing these sets it was found that great care is needed in washing the plating liquid out from under the knob. If this is not done the weights vary with changes in atmospheric humidity, as is the case with gold-plated weights. Some indication of the degree of care needed was given by the fact that one of the three sets was at first too variable to warrant regular certification, although a careful laboratory assistant, familiar with electroplating work, thought that he had washed this set thoroughly and just as carefully as the other two sets.

As in the case of gold-plated sets, it was found that this chromium-plated set could readily be made constant by proper boiling and rinsing.

QUALITY OF PURIFIED WOOD FIBERS

The following is a summary of a report on purified wood fibers presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, held in New York on February 19.

As a result of an investigation in progress at the bureau, it is indicated that certain types of highly purified wood fibers, which are commercially obtainable at the present time, are suitable for conversion into high-grade bond and permanent record papers, as well as any other types of papers where the qualities of durability and permanence are essential. Such papers have hitherto been made only from the best grades of rag fibers, which are considerably more expensive than the purified wood fibers.

Pure cellulose, commonly called alpha cellulose, has a high degree of permanency. The cotton fiber is the purest form of cellulose found in nature. For this reason papers carefully prepared from high-grade cotton rags have hitherto been used exclusively where permanence extending over hundreds of years is desired. The ordinary wood fibers, even those of the best grades, have impurities and degraded forms of cellulose present which seriously affect their per-

manence. By a series of chemical treatments, which have been developed by a pulp and paper manufacturer, these objectionable impurities are removed, leaving a fiber similar in its chemical composition to the cotton fiber and having the desired paper-making characteristics.

In order to find out how the purified wood fibers would endure as compared with other commonly used paper-making fibers, tests are being made of the various types of paper-making wood fibers and of several grades of rag fibers. These tests include chemical purity, whiteness, and microscopical structure. A thorough investigation of the strength and durability of a series of representative commercial papers prepared from fibers similar to the above is also being made.

The relative durability of the various paper-making fibers is studied by means of accelerated aging tests, whereby a few hours' treatment simulates the effect of natural aging over a long period of years. The samples are baked in dry form at 100° C., are cooked with steam, and are exposed to intense light rays from an artificial sun. After all these severe treatments the samples are again subjected to searching tests to find how much they have deteriorated, both chemically and physically. In all cases, while the ordinary wood fibers show the expected rapid deterioration, the purified wood fibers withstand the aging tests practically as well as the highest grade of rag fibers.

While further study is being made, it would appear that fibers approaching closely to cotton fiber in paper-making value can be made from materials having originally much less value than cotton. This development is similar to that of rayon and, in fact, is an offshoot from a study of the utilization of wood fiber for making rayon.

TENSILE STRENGTH OF CHROME AND VEGETABLE TANNED LEATHERS

The comparative strengths of leathers tanned by the chrome and vegetable processes have recently been the subject of considerable discussion. Since the former is characterized by higher hide substance and less filling material, it would seem that its strength would be greater than that of vegetable-tanned leather, and it has generally been considered that chrome tanned leather is superior in this respect. Tests have been completed, however, which indicate that the opposite may be true. In cooperation with three tanners, steer hide, calfskin, and sheepskin leathers were prepared by both methods. Several skins were selected in each case and cut down the back, and alternate sides tanned with vegetable materials. The remaining sides were tanned by the chrome process. Both leathers were given the usual finishing treatments used commercially. Each leather unit was cut into small strips each 6 inches long and 1½ inches in width. The strength and stretch of each strip were determined and an average value obtained for each unit. The results were as follows: Steer hide, vegetable tannage, tensile strength, 5,045 lbs./in.^{2}, stretch at failure, 28.6 per cent; chrome tannage, 3,395 lbs./in.^{2}, 35.6 per cent; calf hide, vegetable tannage, tensile strength, 4,850 lbs./in.^{2}, stretch at failure, 28.1 per cent; chrome tannage, 5,850 lbs./in.^{2}, 38.7 per cent; sheep hide, vegetable tannage, tensile strength, 3,495 lbs./in.^{2}, stretch at failure, 36.3 per cent; chrome tannage, 2,900 lbs./in.^{2}, 44.3 per cent.

The strength of both the steer hide and sheepskin vegetable-tanned leathers is greater than for the corresponding chrome-tanned leathers. The reverse is true for the calfskin leathers. The percentage stretch is greater for all chrome-tanned leathers. The above results were all obtained on samples cut lengthwise of the leather unit. Tests on other samples cut crosswise gave results substantially checking these excepting that the vegetable-tanned calf leather was also found to be stronger than the chrome tanned. The comparisons are not considered as final, but do indicate that chrome-tanned leather does not necessarily possess greater strength than vegetable-tanned material.

The detailed report of this work was published in the January issue of the

Journal of the American Leather Chemists Association in the 1927–28 Report of the Committee on Properties of Leather.

STRENGTH OF SAND-LIME BRICK

The bureau, in the course of its investigation of the properties of sand-lime brick, has accumulated considerable data on the strength of the brick. However, the majority of tests of the commercial product have been made on small lots, usually 5 or 10 brick from each manufacturer, as required by the specifications. It was considered desirable to obtain additional information on the strength of the brick, and particularly on the variation in strength of the product produced by an individual manufacturer. Consequently 25 manufacturers have supplied 50 brick each, representing their regular production, for use in these tests.

After drying to constant weight, the absorption by total immersion in cold water was obtained at the 5-minute, 5-hour, and 24-hour periods. The absorption on boiling for five hours was also determined. Ten of each group of 50 brick were then selected, using care to obtain a range of absorption, and these 10 were reserved for freezing tests, to determine the weathering properties of the brick. The other 40 were dried and broken transversely to determine the modulus of rupture. The compressive strength of each half of each brick was then determined, one half having been tested on edge the other half tested flat. The results obtained thus far show that the absorption ranged from 13.7 to 21.6 per cent of the weight of the dry brick; the modulus of rupture from 330 to 730 lbs./in.^{2}; the compressive strength, flat, from 2,150 to 4,470 lbs./in.^{2}; and the compressive strength, on edge, from 1,500 to 3,850 lbs./in.^{2}

COMPRESSIVE AND TRANSVERSE STRENGTH OF BRICK

The April issue of the Bureau of Standards Journal of Research will contain a paper reporting the compressive strength flat and on edge, and the transverse strength of 27 makes of bricks covering a range of conditions in method of manufacture and degree of burning. The attempt is made to correlate the variation in ratios of these different measures of strength with the various structural features of the brick.

The following conclusions apply to the data thus presented:

1. The tendency of soft mud brick is to give higher unit strengths when tested on edge than when tested flat.

2. The "compacting effect" on the structure of the edge-set brick by the superimposed weight of the other bricks in the kiln is offered as a tentative explanation of the tendency toward higher strength on edge.

3. This tendency toward higher strength on edge is overcome by laminar and cracking structure in the case of certain bricks.

4. Soft mud brick tend to display less deviation in the ratio modules of rupture to flat compressive strength than any of the other methods of manufacture, but even with these the ratio ranged between 0.13 and 0.26.

5. Auger lamination in end-cut brick appears to be associated with high ratios for modulus of rupture to flat compressive strength.

6. Die lamination in side-cut brick appears to be associated with low ratios for modulus of rupture to flat compressive strength.

7. The ratio of the compressive strength of brick tested flat to the compressive strength of brick tested on edge ranges from 0.74 to 2.3.

8. In view of the variation in the ratio of the compressive strength of brick tested flat to the compressive strength when tested on edge, there exists no general rule for converting values from one kind of test to the other kind.

9. The ratio of the modulus of rupture to flat compressive strength ranged from 0.426 to 0.070.

10. In view of the variation in the ratio of the modulus of rupture to compressive strength when tested flat the possibility of inferring a compressive strength from a transverse test or vice versa is open to very large errors for any given make of brick.

CAST STONE

The bureau has determined the absorption of numerous samples of cast stone. In connection with this work it has been suggested that the absorption may be due to a low dry weight of the sample caused by partial dehydration of some of the colloidal material present in the stone when the latter is dried at temperatures as high as 110° C. It is also possible that high absorptions may result from boiling the sample for the total absorption, thus producing continued hydration of some of the cement which has not set.

With these possibilities in mind, the following method of absorption was tried. Cores were cut from each of 12 typical samples. These were maintained at 35° C. in dry air until a loss of not more than 0.05 per cent in four hours was obtained. The specimens were then totally immersed in 300° mineral seal oil and the absorption noted over a period of 48 hours. Then the specimens and oil were placed in a closed chamber, the pressure reduced and maintained at 4 mm mercury for five hours. The absorptions were then calculated to the equivalent of water as per cent of dry weight of specimens. The specimens absorbed from 1.6 to 9.3 per cent in 48 hours, one specimen being below 2 per cent. After reducing the pressure to 4 mm the absorptions ranged from 2.2 to 13.4 per cent.

Thus, even under conditions where the possibility of dehydration is reduced and the rehydration eliminated, cast stone does absorb a considerable quantity of water and the absorption as generally carried out, using water, is a fair measure of the pore space of the stone.

REFRACTORIES INVESTIGATION

Reference to data of interest which have developed as a result of the study of fundamental properties of fire clays and fire-clay bricks have appeared from time to time in the Technical News Bulletin, the most recent reference having been made in the August, 1928, issue. A progress report, giving in detail the complete method of procedure followed in this study and the results of tests, has been prepared for publication at an early date. A brief summary of the most important results is here given.

Thermal expansion data determined on the fire bricks "as received" from the manufacturer and after reheating in the laboratory kilns at 1,400, 1,500, and 1,600° C. show that both the rate of expansion and total expansion of the majority of bricks decrease as the temperature of firing is increased. These data also indicate that the thermal expansion behavior of the finished bricks may not necessarily be the average rates of expansion of the clays entering into their manufacture.

The modulus of elasticity of the bricks increased greatly at 550° C. when compared to values obtained in tests made at 20° C. At 1,000° C. the modulus of elasticity decreased greatly; that is, the bricks became less rigid and more subject to plastic deformation. The modulus of elasticity and transverse strength determined at room temperature increased as the temperature of firing of the bricks was raised. Resistance of fire bricks to spalling decreased with increase of modulus of elasticity and increase of thermal expansion.

Data were obtained which show that sufficient differences exist in the physical properties of bricks of the same brand to cause large variations in the number of quenchings required to cause spalling.

An empirical relation of the modulus of rupture, transverse strength, coefficient of expansion, and total grog content of the brick is given, which results in a factor expressing the relative resistance of the various bricks to spalling in the water quenching test.

STANDARD SAMPLES

A standard sample of opal glass of the following composition is now ready for distribution: Silica 67.5 per cent, calcium oxide 10.5 per cent, sodium oxide 8.4 per cent, potassium oxide 3.2 per cent, alumina 6.0 per cent, fluorine 5.7 per cent, arsenic trioxide 0.2 per cent, arsenic pentoxide 0.1 per cent, and ferric oxide 0.08 per cent. The price of this glass is $2 per sample of 45 grams. If remittance does not accompany the order, the sam-

ples will be sent by parcel post C. O. D. to addresses in the United States.

STANDARD VISCOSITY SAMPLES

The bureau has for sale several types of oil samples (6 petroleum and 1 castor oil) for use in calibrating viscosimeters, ranging in viscosity from 20 to 8,000 centipoises, between temperatures of 15 to 30° C. The charge is $5 per 1-quart sample, which includes a statement of the exact viscosity (within ±0.5 per cent) at any one temperature at the time of purchase. Additional viscosities will be charged for at the rate of $5 per temperature.

Remittance payable to the Bureau of Standards must accompany order. Samples will be forwarded via express, collect, to addresses in the United States. Orders from foreign countries should include an amount to cover parcel post for a total weight of 5 pounds, including packing.

NEW AND REVISED PUBLICATIONS ISSUED DURING FEBRUARY, 1929

Journal of Research [1]

Bureau of Standards Journal of Research, Title page and index to Volume 1, July to December, 1928 (RP Nos. 1 to 36, inclusive). Free on application to the Bureau of Standards.

Bureau of Standards Journal of Research, Vol. 2, No. 2, February, 1929 (RP Nos. 38 to 44, inclusive). Obtainable only by subscription. (See footnote.)

Research Papers [1]

RP38. A technical method of using the mercury arc to obtain data at wave length 560 millimicrons in the spectrophotometric analysis of sugar products; H. H. Peters and F. P. Phelps. Price, 5 cents.

RP39. Reflecting power of beryllium, chromium, and several other metals; W. W. Coblentz and R. Stair. Price, 5 cents.

RP40. Note on a piezo-electric generator for audio-frequencies; August Hund. Price, 5 cents.

RP41. Heats of combustion of organic compounds; M. S. Kharasch. Price, 15 cents.

RP42. Laboratory corrosion tests of mild steel with special reference to ship plate; H. S. Rawdon. Price, 5 cents.

RP43. Least retinal illumination by spectral light required to evoke the "blue arcs of the retina"; Deane B. Judd. Price, 5 cents.

RP44. The service of refractory blocks in a small experimental glass tank; W. L. Pendergast and Herbert Insley. Price, 15 cents.

Circulars [1]

C373. Recommended specifications for quicklime for use in the distillation of ammonia from ammonia liquors obtained in coke and gas manufacture. Price, 5 cents.

C374. X-ray and radium protection. Recommendations of International Congress of Radiology. Price, 5 cents.

Simplified Practice Recommendations [1]

RXI–28. Simplified Practice—What it is and what it offers (1928 edition). Price, 15 cents.

R9–28. (2d ed.) Woven-wire fencing. Price, 5 cents.

R19–28. (3d ed.) Asbestos paper and asbestos millboard. Price, 5 cents.

R78–28. Iron and steel roofing. Price, 5 cents.

Commercial Standards [1]

CS3–28. Stoddard solvent (dry cleaning). Price, 10 cents.

[1] Send orders for publications under this heading with remittance only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 25 cents per year (United States and its possessions, Canada, Cuba, Mexico, Newfoundland, and Republic of Panama); other countries, 40 cents. Subscription to Bureau of Standards Journal of Research, $2.75; other countries, $3.50.

[1] Send orders for publications under this heading with remittance only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 25 cents per year (United States and its possessions, Canada, Cuba, Mexico, Newfoundland, and Republic of Panama); other countries, 40 cents. Subscription to Bureau of Standards Journal of Research, $2.75; other countries, $3.50.

Miscellaneous Publications [1]

M86. Tables of spectral energy distribution and luminosity for use in computing light transmissions and relative brightnesses from spectrophotometric data; J. F. Skogland. Price, 10 cents.

M87. Report of the 21st national conference on weights and measures held at Bureau of Standards, Washington, D. C., May 22–25, 1928. Price, 35 cents.

Supplement to M90. Supplement to the directory of commercial testing and college research laboratories. Free on application to the Bureau of Standards.

M91. Standards Yearbook, 1929. Price, (cloth bound), $1 (foreign, $1.20).

Technical News Bulletin [1]

TNB143. Technical News Bulletin, March, 1929. Obtainable only by subscription. (See footnote.)

OUTSIDE PUBLICATIONS [2]

Uses of radio as an aid to air navigation. J. H. Dellinger; Journal American Institute of Electrical Engineers (New York, N. Y.), Vol. XLVIII, No. 2, p. 105; February, 1929.

Equilibrium volatility of motor fuels. O. C. Bridgeman; Bulletin, American Petroleum Institute (New York, N. Y.), Vol. X, No. 2; Section II, p. 124; January 3, 1929.

Relation of fuel to engine acceleration. D. B. Brooks; Bulletin, American Petroleum Institute (New York, N. Y.), Vol. X, No. 2; Section II, p. 143; January 3, 1929.

Note on the total eclipse of the moon, November 27, 1928. Hugh G. Boutell; Popular Astronomy (Northfield, Minn.), Vol. XXXVII, No. 2, p. 112; February, 1929.

The reversible addition of ethyl alcohol to para-bromobenzonitrile catalyzed by sodium, potassium, and lithium ethylates. C. N. Myers and S. F. Acree; Journal, American Chemical Society (Washington, D. C.), Vol. 50, p. 2916; November, 1928.

Decomposition of barium sulphate by solutions of sodium carbonate. Edward Wolesensky; Industrial and Engineering Chemistry (Washington, D. C.), Analytical edition, Vol. 1, No. 1, p. 29; January 15, 1929.

The McCollum-Peters electric telemeter. The Whittemore strain gauge. Sections I and II of bulletin issued by the Southwark Foundry & Machine Co. (Philadelphia, Pa.), January 2, 1929.

Testing welded joints for aircraft structures. H. L. Whittemore; Airway Age (New York, N. Y.), Vol. 10, No. 2, p. 161; February, 1929.

Correlation of laboratory corrosion tests with service: Weather exposure tests of sheet duralumin. H. S. Rawdon; American Institute of Mining and Metallurgical Engineers (New York, N. Y.), Technical Publication No. 173; February, 1929.

Steel requirements of the aircraft industry. H. J. French; American Iron and Steel Institute (New York, N. Y.), Yearbook, p. 350; 1928.

Vanadium and molybdenum compounds in clays. L. A. Palmer; Journal, American Ceramic Society (Columbus, Ohio), Vol. 12, No. 1, p. 37; January, 1929.

The Bureau of Standards. Hugh G. Boutell; The Armour Engineer (Chicago, Ill.), Vol. XX, No. 22, p. 45; January, 1929.

The following articles were published in the series on Physical Science in the United States Daily (Washington, D. C.):

Paul R. Heyl: The constant of gravitation; February 13, 1929.

Frank Wenner:

Earthquakes; February 18, 1929.

New type of seismometer; February 19, 1929.

[1] Send orders for publications under this heading with remittance only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 25 cents per year (United States and its possessions, Canada, Cuba, Mexico, Newfoundland, and Republic of Panama); other countries, 40 cents. Subscription to Bureau of Standards Journal of Research, $2.75; other countries, $3.50.

[2] "Outside publications" are not for distribution or sale by the Government. Requests should be sent direct to publishers.

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